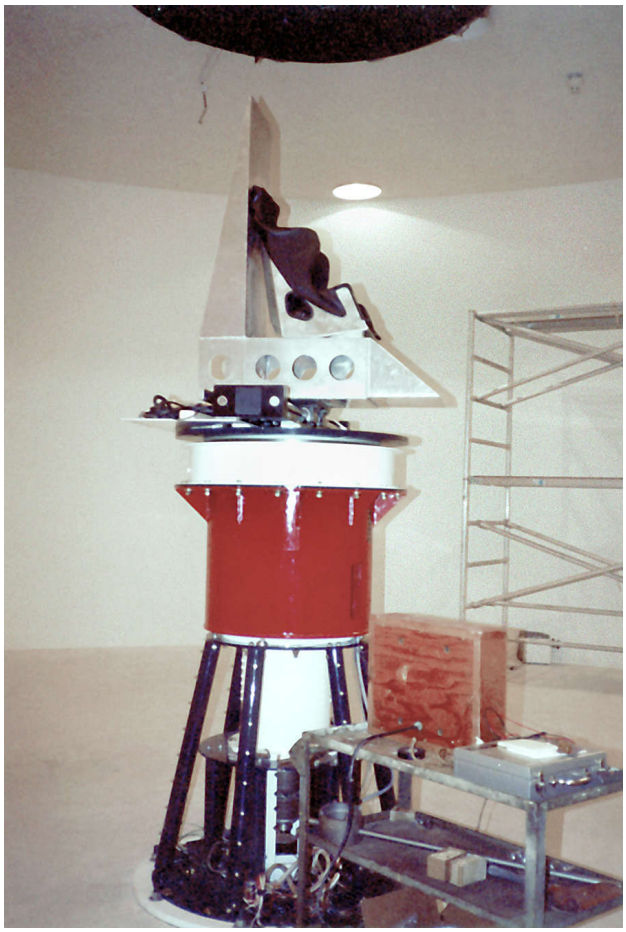
Vestibular Test Development

CDR Angus Rupert, MC USN
Naval Aerospace Medical Research Laboratory, 51 Hovey Road,Pensacola, Florida 32508-1046
(850) 452-4496
arupert@namrl.navy.mil

The purpose of this project is to improve selection and training standards related to combat operations in the aviation environment. Our primary objective is to develop a DOD capability to detect vestibular disorders incompatible with military aviation.

Spatial disorientation (SD) is a triservice aviation problem that annually costs the DOD over $300 million in destroyed aircraft. Spatial disorientation is the number one cause of pilot-related mishaps in the Navy and the Air Force. The Naval Safety Center Aeromedical Newsletter 90-3 reports that for 1980-89, disorientation/vertigo was listed as the definite cause factor in mishaps that resulted in loss of 38 lives and 32 aircraft. The 91-3 Newsletter reports that during Desert Storm, four of eight single-pilot aircraft and three of six helicopter noncombat mishaps were due to SD. Brig. Gen. Rufus DeHart, Command Surgeon, USAF Tactical Air Command, reported in Aviation Space and Environmental Medicine, Vol. 57:725, July 1986, that, "The most significant human-factors (HF) problem facing the TAF today is spatial disorientation (SD) followed by high-G loss of consciousness. Of all HF mishaps, 30% in the F-16 and 19% in the F-15 and F-4 are due to SD." Many of the mishaps caused by vestibular deficits would be preventable if the expertise and assessment techniques were available.

This research and development effort includes the development of a DOD vestibular assessment capability to assure that pilots have the necessary attributes to reduce SD mishaps. The clinical vestibular tests presently available to neurologists are qualitative, highly subjective, and frequently uncomfortable to the patient. During the initial screening of aviators, the only test of vestibular function used is the 10-second Romberg (self-balance) test. However, this test can be passed by vestibular-compromised subjects who have developed good non-labyrinthine compensatory mechanisms. Frequently, aviators come to our attention late in flight training or after designation who do not have the necessary vestibular function to fly safely. Vestibular deficits, if detected, usually come to the attention of flight surgeons when flight instructors observe training problems and refer students or aviators to the flight surgeon. Most frequently, vestibular deficits present as the inability to maintain controlled flight in instrument meteorological conditions when the pilot is deprived of outside visual references. The final results of this research and development program will be the identification of the very best qualified personnel for pilots, improved aviator performance to enhance mission effectiveness, and the reduction of costs attributable to SD mishaps.



Short-arm centrifuge for otolith-function testing.